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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/550,704	07/13/2006	James Martin	14 0237-PCT-US	3099
28116	7590	08/03/2009		
WesternGeco L.L.C. Jeffrey E. Griffin 10001 Richmond Avenue HOUSTON, TX 77042-4299			EXAMINER SAITO, KRYSTINE E	
			ART UNIT 3663	PAPER NUMBER
			NOTIFICATION DATE 08/03/2009	DELIVERY MODE ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary

Application No.

10/550,704

Applicant(s)

MARTIN ET AL.

Examiner

Krystine Saito

Art Unit

3663

Period for Reply -- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 15 July 2009.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1, 10, 12-16 and 20-28 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1, 10, 12-16 and 20-28 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 27 September 2005 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

DETAILED ACTION

Response to Arguments

1. Applicant's arguments with regards to claims 1 and 20-28 filed 07/15/2009 have been fully considered but they are not persuasive.
2. The Applicant argues that Ray modified by Berni does not teach "acquiring, or retrieving from storage, seismic data representative of acceleration wavefield". He argues that Ray teaches acceleration-cancelling hydrophones. The Examiner contends that the embodiment of Ray which teaches the acceleration-cancelling hydrophones is merely one embodiment of the invention and is not necessary to the data processing steps. Furthermore, Ray merely used to teach performing said data processing steps on *seismic data* as is required by the claim.
3. The Applicant argues that Berni does not teach using *only* acceleration data, that it teaches using acceleration and pressure signals. However, the claims do not state using *only* acceleration data. They do not exclude using both acceleration and pressure data.
4. The Applicant argues that Ray and Berni are not combinable because performing the steps of Ray on the seismic data of Berni is not obvious, since Ray uses velocity data and Berni uses acceleration data. However, it is a well known fact that acceleration is merely the derivative of velocity and thus the steps applicable to be performed on one type of data are applicable to be performed on the other with the appropriate mathematical corrections.

5. The Applicant argues that neither Ray nor Berni teaches a demultiple algorithm. However, as shown in the previous office action, Ray teaches correcting the ghost arrivals. Since it is well known in the art that multiples are a type of ghost noise in the data, the ghost removal is functionally equivalent to removing the multiples.
6. The Applicant argues that while Ray teaches applying a post-stack deconvolution algorithm, it does not indicate that this is for the purpose of whitening the spectrum. However, it has been held that a recitation with respect to the intended use of a step or apparatus does not differentiate it from prior art.
7. The applicant argues that Ray modified by Berni does not teach applying a trace equalization algorithm and equalizing amplitudes of stacked data. However, Berni does teach normalizing amplitudes of the seismic data signals using filters as shown in the previous office action. Ray teaches, for example in Figure 15, performing filtering on post-stack data.
8. The Applicant argues that Ray in view of Berni and further in view of Barr does not teach "acquiring, or retrieving from storage, seismic data representative of acceleration wavefield". However, Berni does address acceleration data as discussed above.
9. The Applicant argues that while Ray in view of Berni and further in view of Schiflett teaches applying a pre-stack deconvolution algorithm, it does not indicate that this is for the purpose of attenuating short period reverberations. However, it has been held that a recitation with respect to the intended use of a step or apparatus does not differentiate it from prior art.

10. The Applicant argues that Ray in view of Berni and further in view of Kamas does not teach "acquiring, or retrieving from storage, seismic data representative of acceleration wavefield". However, Berni does address acceleration data as discussed above.

11. Applicant's arguments, see pages 10-11, filed 07/15/2009, with respect to the rejection(s) of claim(s) 10 and 12-16 under 35 U.S.C. 103 have been fully considered and are persuasive. Therefore, the rejection has been withdrawn. However, upon further consideration, a new ground(s) of rejection is made in view of Ray in view of Berni and further in view of Leaney (6868038) and Allen (6151556) as discussed below.

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1, 20, 21, 23, 24, 26, and 28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ray (4353121) in view of Berni (4520467).

3. Ray discloses applying a gain recover to the seismic data (Col 4, line 66; Fig 15: 62); applying a normal moveout correction to the seismic data (Col 5, lines 2-3; Fig 15: 70); muting the seismic data (Fig 15: 72); stacking the seismic data (Col 5, lines 3-4; Fig 15: 74); and applying a time migration to the seismic data (Fig 15: 100); applying a demultiple algorithm to remove events that involve multiple passes through a water column in which a receiver used to acquire the seismic data is disposed (Col 5, lines 8-

9); applying a post-stack deconvolution algorithm to whiten a signal spectrum (Fig 15: 100).

4. However, Ray does not disclose acquiring, or retrieving from storage, seismic data representative of an acceleration wavefield; removing an effect of a signature of the source used to acquire the seismic data; applying a trace equalization algorithm to the seismic data; equalizing amplitudes of the stacked seismic data; combining seismic data with pressure data; a seismic source for emitting seismic energy; and a seismic receiver for acquiring seismic data representative of the acceleration wavefield.

5. Berni teaches acquiring, or retrieving from storage, seismic data representative of an acceleration wavefield (Col 4, lines 4-32); removing an effect of a signature of the source used to acquire the seismic data (Col 5, lines 51-53); applying a trace equalization algorithm to the seismic data (Col 4, lines 62-68; Col 5, lines 1-2); equalizing amplitudes of the stacked seismic data (Col 2, lines 15-19, 24-29); combining seismic data with pressure data (Col 2, lines 1-68); a seismic source for emitting seismic energy (Col 3, lines 58-59); and a seismic receiver for acquiring seismic data representative of the acceleration wavefield (Col 4, lines 9-11, 14-17).

6. It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the method of Ray with the steps of Berni since such a modification would have further removed noise from the seismic trace and provided a better image of the subsurface.

7. Claims 10, and 12-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ray in view of Berni, and further in view of Leaney (6868038).

8. Ray as modified teaches the invention as discussed above. However it does not teach an input interface for receiving seismic data representative of acceleration wavefield; a data processor; and memory comprising program instructions executable by the processor; the seismic source and the receiver are each disposed at or on the earth's surface; and the seismic source is disposed at or on the earth's surface and the receiver is disposed within a borehole.

9. Leaney teaches an input interface for receiving seismic data representative of acceleration wavefield (Col 7, lines 60-62); a data processor (Col 7, line 52); and memory (Col 7, lines 52-53) comprising program instructions executable by the processor (Col 7, lines 54-55); the seismic source and the receiver are each disposed at or on the earth's surface (Col 1, lines 9-11); and the seismic source is disposed at or on the earth's surface and the receiver is disposed within a borehole (Col 1, lines 17-20).

10. It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the method of Ray as modified to use the system of Amundsen since such a modification would have allowed it to be used in a wider variety of applications.

11. Claim 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ray in view of Berni and Leaney, and further in view of Allen (6151556).

12. Ray as modified teaches the invention as discussed above. However it does not teach the seismic source is disposed in a water column and the receiver is located at the base of the water column.

13. Allen teaches the seismic source is disposed in a water column and the receiver is located at the base of the water column (Col 3, lines 33-45).

14. It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the method of Ray as modified to use the system of Allen since such a modification would have allowed it to be used in a wider variety of applications.

15. Claim 16 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ray in view of Berni and Amundsen, and further in view of Quinn (2004/0109389).

16. Ray as modified teaches the invention as discussed above. However it does not teach the seismic source is disposed in a water column and the receiver is disposed within a borehole.

17. Quinn teaches the seismic source is disposed in a water column and the receiver is disposed within a borehole ([0004], lines 2-3, 9-10).

18. It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the method of Ray as modified to use the system of Quinn since such a modification would have allowed it to be used in a wider variety of applications.

19. Claim 22 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ray in view of Berni, and further in view of Barr (4979150).

20. Ray as modified teaches the invention as discussed above. However, it does not teach removing coherent noise from the seismic data.

21. Barr teaches removing coherent noise from the seismic data (Col 2, line 36). It would have been obvious to one of ordinary skill in the art at the time of the invention to

modify the method of Ray as modified with the step of Barr since such a modification would have led to clearer and more useful data.

22. Claim 25 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ray in view of Berni, and further in view of Schifflett (5642327).

23. Ray as modified teaches the invention as discussed above. However, it does not teach applying a pre-stack deconvolution algorithm.

24. Schifflett teaches applying a pre-stack deconvolution algorithm (Col 9, line 6). It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the method of Ray to include the step of Schifflett since such a modification would have led to noise reduced data for further processing.

25. Claim 27 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ray in view of Berni, and further in view of Kamas (2004/0070529).

26. Ray as modified teaches the invention as discussed above. However, it does not teach applying a time-varying bandpass filter to the seismic data.

27. Kamas teaches applying a time-varying bandpass filter to the seismic data ([0026], lines 6-8). It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the method of Ray to include the step of Kamas, since such a modification would have reduced the amount of computation necessary by providing only data in a useful frequency range.

Conclusion

The prior art which is cited but not relied upon is considered pertinent to applicant's disclosure.

The references made herein are done so for the convenience of the applicant. They are in no way intended to be limiting. The prior art should be considered in its entirety.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Krystine Saito whose telephone number is 571-270-7614. The examiner can normally be reached on Monday thru Thursday, 8am-5:30pm EST and alternate Fridays 8am-4:30pm EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jack Keith can be reached on 571-272-6878. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/K. S./
Examiner, Art Unit 3663

/Scott A. Hughes/
Examiner, Art Unit 3663